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EVALUATION OF THE EFFECTS OF BOMBING
ON INFILTRATION

ORR Project B-2233

8 March 1967

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I. The Infiltration of Supplies

A. Truck Traffic in the Laotian Panhandle

Truck traffic observed moving from North Vietnam toward Laos during the current dry season (October 1966-June 1967) indicates that despite the bombing, the Communists will probably again increase the volume of supplies moved south through the Panhandle as they did last year. The major traffic movements this year appear to be on two routes (Route 15 through the Mu Gia Pass and Route 912) and are not confined to Route 15 as they were during previous years. The flow of supplies began earlier this year than it did last year and larger trucks are being used.

The total level of traffic moving into Laos this dry season cannot be estimated because observation of traffic on Route 912 has not been available since 22 October 1966. Truck traffic on the older route through Mu Gia Pass has averaged 23 trucks per day on days of observation since early October 1966 through 21 February 1967. (See Table 1.) If one omits the very large number of trucks that moved south during the TET truce period, the traffic averaged 20 trucks per day. Thus, the level of traffic moving supplies over just the one route compares with an estimated total of 28 trucks per day entering Laos during the 1966 dry season and 17 trucks per day in the 1965 dry season (omitting trucks said to be carrying troops in those years). The observed size of trucks has increased each year, and the trucks are estimated to be carrying 4 tons per truck

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Table 1
Truck Traffic Observed Moving Toward Laos Through
the Mu Gia Pass Area a /
October 1966-February 1967

<u>Month</u>	<u>Actual Number Observed</u>	<u>Number of Days. of Observation</u>	<u>Average b/ Number of Trucks Per Day</u>
October 1966	290	22	13
November 1966	532	27	20
December 1966 c/	12	5	2
January 1967	632	23	27
1-21 February 1967	718	18	40
(Tet period: 7-10 February 1967)	(385)	(4)	(96)
Total including Tet	2,184	95	23
Total excluding Tet	1,799	91	20

a. Based on reports of ground observers who usually watched the roads during hours of darkness.

b. The actual numbers of trucks observed divided by the number of days of observation.

c. Team withdrawn on 6 December in anticipation of bombing of area and returned on 3 January 1967.

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this dry season compared with 3 tons in the past dry season and 2 tons in the previous dry season.

Truck traffic into the Laotian Panhandle began this dry season in early October compared with mid-November last dry season and in late December in the 1965 previous season. If the current level of truck traffic is maintained throughout this dry season, traffic through the Mu Gia Pass alone could deliver into Laos more tonnage than is estimated to have been delivered by trucks over this route during the past dry season.

<u>Season</u>	<u>Average Number of Trucks per Day</u>	<u>Number of Days in Season</u>	<u>Tons per Truck</u>	<u>Estimated Tonnage</u>
1965 Dry Season	19	180	2	6,000
1966 Dry Season	28	210	3	17,000
1967 Dry Season	20	255	4	20,000

Most of the supplies moving into Laos are for consumption by the Communist forces there or, are put into stockpiles. Probably about 20 percent of the supplies moved into Laos are lost in transit or to air attack. During 1965 at least 900 tons and during 1966 more than 7,000 tons of supplies were moved through Laos to the border of South Vietnam.

During the current dry season only a low level of traffic has been reported by ground observers on roads leading from the Mu Gia Pass area, suggesting that for the most part supplies are being stockpiled

near Mu Gia Pass for forward movement later in the season.

Truck traffic moving south from Mu Gia Pass can continue to move south over bypass roads to Route 23 and further south over Routes 23 and 911.

A road-watch team located on Route 23 about 3 miles southwest of its junction with Route 12 reported that from October through mid-November it saw only 11 trucks go south. Other teams south of this location saw no trucks until 15-19 January when a team located about 37 miles north of Route 9 reported that an average of 45 trucks a day moved south, past it. Since that time a daily average of about 10 trucks a day has been reported moving south past teams on Route 23. During the 1965-1966 dry seasons an average of about 5 trucks a day went south past a road-watch team on Route 23.

A team on Route 911 about 3 miles south of Route 23 reported that practically no truck traffic moved past it from the start of the dry season until 31 December when an average of about one a day moved south. Traffic continued at about this level until 19-21 February when about 28 trucks a day a day moved south.

Coverage along Route 9 and routes south of Route 9 has been incomplete during the present dry season, but available reports from ground observers indicate that practically no trucks have passed teams along the roads from which reports have been received. It is possible, however, that trucks are moving over routes not covered by road-watch teams.

B. The Movement of Supplies in Route Packages 1 and 2 (See Map)

The major logistic effort in support of the infiltration of supplies into South Vietnam is concentrated in the areas covered by armed reconnaissance Route Packages 1 and 2, corresponding to that part of North Vietnam south of Vinh. The bombing campaign has not adversely affected North Vietnam's ability to move supplies south of Vinh, despite the heavy weight of the total air effort in this region.

Pilot sightings of watercraft along the coast and in the inland waterways of North Vietnam have been heaviest in the area of Vinh between 18° and 19° N. The key transshipment areas at Vinh, Quang Khe, and Dong Hoi are operational and continue to perform a key function in the movement of supplies south. Truck traffic, used for distributing material to the DMZ or into Laos, continues to flow through the Mu Gia Pass. According to road watch reports from the Mu Gia area, an average of 80 tons a day have been trucked along this route into Laos since October. Truck sightings also continue to be heavy along Route 1A south of Dong Hoi, and on Routes 101 and 102, near the DMZ. The road network, while cratered innumerable times, has been kept repaired so that traffic continues to move. The construction of new routes, bypasses, bypass bridges and ferries has further decreased the effectiveness of the bombing.

The light-weight rail line south of Vinh continues to be used in certain sections, although bombing has limited its use. The North Vietnamese are currently rebuilding the inoperable section in the

LAOS PANHANDLE - THE LOGISTIC FUNNEL

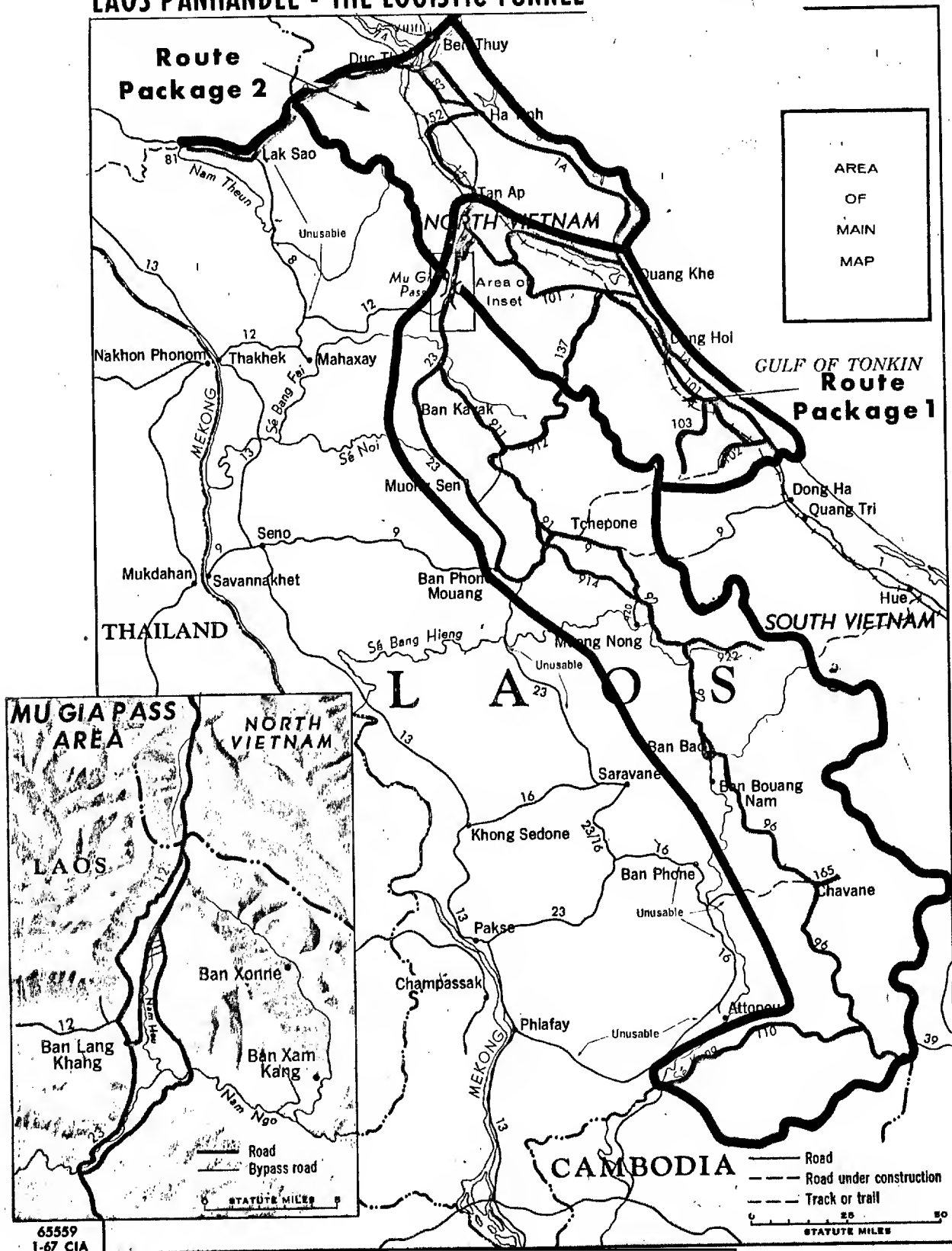


Figure F-1. The Laos Panhandle: "The Logistic Funnel"

southern part of Route Package 1 and extending it towards the IMZ. Also, repair work was noted on the spur from Tan Ap towards the Mu Gia Pass before and during TET. These two improvements in the rail line will greatly increase the logistic capability of the North Vietnamese in the area south of Vinh.

We estimate that the total amount of supplies moved into southern North Vietnam during 1966 has been at least at the levels estimated for December 1965. In that month it was estimated that 20,000 tons of supplies (rice, POL, and military goods), were transported into the four southern provinces of NVN.

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Bombing of the roads and rail

line in the southern area has resulted in the Vietnamese shifting a considerable amount of traffic to water transport, but on the whole it appears that supplies have continued to move south at least at the December 1965 rate if not higher. The bombing has made the movement difficult and costly, but the North Vietnamese have been adept at maintaining a transport system adequate to provide whatever supplies they decide are needed in the south.

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II. Effect of the Bombing on Infiltration of Men and Supplies

A. General Appraisal

Despite the increased efforts to interdict the flow of men and supplies from North Vietnam to South Vietnam during 1966, North Vietnam was able to increase its support of the insurgency in South Vietnam. The air campaigns against targets in Laos and North Vietnam were not able to prevent about a three-fold increase in the level of personnel infiltration in 1966. The external logistic support needed to maintain the expanded Viet Cong/North Vietnamese force in South Vietnam has been adequate. The flow of supplies through Laos to the border of South Vietnam in 1966 was almost eight times the level of 1965. Data on current supply movements indicate that they will be at least at 1965 levels and may be considerably higher.

Despite the intensified bombings the North Vietnamese have been able to improve existing supply networks and to complete significant amounts of new road construction. The road network through Laos, for example, was expanded from about 150 miles at the start of the bombings to 650 miles at the end of 1966. An elaborate system of bypass roads and new construction was also undertaken in the southern parts of North Vietnam. As a result of these programs the North Vietnamese currently have an infiltration network of higher capacity, greater diversity, and less vulnerability to air attack than they had when the bombings started.

These developments have not been without high costs. The diversion of from 600,000-700,000 full-time workers to respond to the

air strikes has reduced North Vietnam's mobilization potential. Moreover, the burden of infiltrating men and supplies has been made more costly and taxed the capabilities and resources of the country.

B. Magnitude of the Bombing Program

The weight of air attack against target systems in North Vietnam and in Laos has accounted for an increasing share of the total air effort in support of US objectives in the Vietnam War. During 1966 the number of sorties flown against targets in North Vietnam was nearly 2.7 times the number flown in 1965; sorties flown against targets in Laos were about 4.8 times the number flown in 1965. The size of this effort and its relation to total air operations in Southeast Asia are shown in the following tabulation:

<u>Area of Operation</u>	<u>1965</u>		<u>1966</u>	
	<u>Number of Sorties</u>	<u>Percent of Total</u>	<u>Number of Sorties</u>	<u>Percent of Total</u>
North Vietnam	55,210	30	147,850	35
Laos	16,030	9	76,110	18
North Vietnam and Laos Combined	<u>71,240</u>	<u>39</u>	<u>223,960</u>	<u>53</u>
South Vietnam	<u>110,310</u>	<u>61</u>	<u>204,120</u>	<u>47</u>
Total Southeast Asia	<u>181,550</u>	<u>100</u>	<u>428,080</u>	<u>100</u>

As the air effort directed against targets in North Vietnam has grown, it has become in effect a massive interdiction program. During 1966, for example, over 98 percent -- 145,000 -- of all sorties flown over North Vietnam, and the greater part of the sorties flown in Laos -- 76,000 -- were allocated to the interdiction program. About 70 percent

of the combined effort was concentrated in the so-called logistic funnel -- Routes Packages 1 and 2 in North Vietnam and the Laotian Panhandle.

C. Direct Effects of the Interdiction Campaign

Aerial photography, pilot reports, and other intelligence sources indicate that the interdiction campaign has imposed high costs on North Vietnam, in both material and human losses. Some of the major losses attributable to the interdiction campaign in both Laos and North Vietnam include:

Bridges Destroyed or Damaged*	492
Transport Equipment Destroyed or Damaged	
Vessels	12,900
Vehicles	7,925
Railroad Stock	3,367
Casualties from Armed Reconnaissance	28,000-30,000

The cost of the damage to transport facilities and equipment alone ranges from \$65-70 million. In addition to the loss of manpower represented by casualties resulting from the interdiction program, North Vietnam has had to commit large amounts of labor to maintain distribution and logistic activities. About 125,000 workers are committed on a full-time basis to road and rail construction, maintenance and repair activities. At least 50,000 full-time workers have had to be added to the transport labor force and about 45,000 full-time workers are committed to dispersal and other emergency programs

* As confirmed by aerial photography.

forced by the interdiction program. Finally, as many as 100,000-200,000 workers are required to support these activities on a part-time basis.

D. Maintenance of the Infiltration Network

1. General

Throughout the bombings the North Vietnamese have mounted an intense effort to keep LOC's and infiltrations networks open. They have constantly increased their ability to counter the effects of US/GVN air strikes and, indeed, have increased the capacity of the transport network. The roads in North Vietnam, primarily, south of Hanoi, have been kept open almost continuously since the start of the bombing by the extensive use of bypasses to destroy highway bridges and the construction of new alternative routes. The following tabulation shows the extent of these improvements during 1965 and 1966 in North Vietnam.

<u>Type of Construction</u>	<u>Miles</u>	
	<u>Road</u>	<u>in Railroad</u>
Newly developed routes	650	30
Improvements to existing routes	350	90
Short bypasses to existing routes	150	60

A similar effort in Laos during the same period resulted in the expansion of the infiltration network in Laos from 150 miles to a total of 650 miles.

The improvement and maintenance of the infiltration network has continued in 1967, reflecting North Vietnam's determination

to maintain an effective and viable system for moving men and supplies into South Vietnam.

2. New Construction Activity During 1967

a. North Vietnam

North Vietnamese workers continued to improve existing highway routes and construct alternate routes during the first two months of 1967. Completion of the 68-mile section between Ha Tinh and Quang Khe of the inland alternate to Route 1A was slowed however by a combination of air strikes and flooding caused by heavy rains.

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Intensified efforts to repair bridges and ferries were made in MR IV during January and early February in preparation for the increased traffic scheduled to move during the TET bombing stand down. Route 15 to Mu Gia Pass and Route 1A south of Dong Hoi were improved to handle the heavy holiday traffic.

Repairs to railroad bridges in North Vietnam and the construction of multiple bypass bridges at strategic crossings continued at approximately the same pace in 1967. The rail lines from China and the port of Haiphong were kept open almost continually while the line south from Hanoi was open periodically to Thanh Hoa and sporadically as far as Vinh. The 30-mile standard gauge rail line from Kep west to Thai Nguyen, was open in early December. The

conversion to dual gauge (meter and standard gauge) of the rail line between Kep and the China border was probably complete by late 1966, and there is evidence of preparations to convert the Thai Nguyen-Nguyen Khe rail line and the Kep-Hanoi line to dual gauge.

b. Laos

Road maintenance and repair in the Laos Panhandle continued during early 1967 together with small amounts of new construction of bypass roads. The entire road system which was rapidly expanded during the 1966 dry season was reopened to through traffic via Routes 92 and 96 by the first week of January. Roads through Mu Gia Pass have continued to be serviceable and Route 23 is now being used along with 911 to the Tchepone area. Although the alternate border crossing from North Vietnam via Route 912 was kept open during the past rainy season, it appears that Mu Gia Pass is also being used again. Route 922 through the Se La Mang River Valley is being extended across the Laos/South Vietnam border into the Ashau Valley in Quang Tri Province. This is the first time that a motorable road from the Ho Chi Minh Trail has been noted extending into South Vietnam. Visual reconnaissance from mid-February indicated that Route 922 was under construction across the border and that trucks are now using it to within 0.5 miles of the border. A new road is under construction east of Route 9. When completed, it will provide a bypass between Route 23 via Muong Phine and Route 92 near Muong Nong. South of Attapeu, Route 110 underwent considerable improvement during January and February and at least 3

short bypasses were constructed around chokepoints. Route 97 which provides the road connection between Route 110 and Siem Pang, Cambodia was reopened to traffic in early January.

3. Countermeasures and Speed of Response

The work units in North Vietnam and Laos have developed a high degree of skill during the past two years of bombing in making repairs and in constructing bypasses to damaged LOC's. Speed and simplicity of repair has been the hallmark of their program. Hand tools and local building materials such as timber, stone, and gravel are the principal means of repairs. Destroyed bridges are frequently replaced by fords, ferries, culverts, and by-pass bridges. In some cases, as many as four alternate crossings have been constructed to bypass a single bridge. The North Vietnamese have developed a new bridging technique using steel cables and removable bridge decking as a relatively rapid means of bridge replacement and to reduce the vulnerability of bridges to air attack. Most of the work is undertaken at night to protect workers from attack. In addition, the North Vietnamese have relied heavily on waterborne traffic to move goods around damaged areas still under repair. Boats, barges and rafts constructed on the site have been noted in photography. Trans-shipment activities have been widely dispersed and concentrations of shipping have been avoided.

The North Vietnamese now have highly organized repair crews and have built multiple bypasses so that the continued movement

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of essential materials is insured. The North Vietnamese have carried out their successful countermeasures through a tightly controlled system of work camps and in the northern part of North Vietnam they are further aided by Chinese engineer troops. The labor force on LOC's in North Vietnam and in the Laos Panhandle has doubled since July 1965. Substantial inputs of Chinese Communist Engineering troops working primarily on North Vietnamese rail and road connections with China have also helped to ensure the continued operation of vital supply lines and freed North Vietnamese labor for deployment elsewhere in the country. It is estimated that up to 125,000 workers and Chinese engineering troops are currently engaged in the full time repair of LOC's in North Vietnam and in the Laos Panhandle. To supplement this full-time labor force, at least 100,000 and probably as many as 200,000 day laborers perform some road and bridge repair in addition to their principal duty in agriculture.

4. Prospects for Interdiction

About 70 percent of all air strikes in North Vietnam and Laos during 1966 were carried out against targets in the "logistic funnel" which comprises Route Packages 1 and 2 in North Vietnam and the road network through the Laotian Panhandle. More than 250 bridges in the logistic funnel were confirmed by aerial photography to be damaged or destroyed. Despite this intensive bombing, the supply lines from North Vietnam to the VC/NVA forces fighting in the south have been kept open.

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Even if the total air attack were concentrated on the "logistic funnel," we estimate that North Vietnam could maintain the flow of men and supplies. The North Vietnamese could respond adequately to the intensified bombing by increasing the size of the labor force engaged in repair work by about 30 percent. This labor would be drawn from areas no longer being bombed. Moreover, the North Vietnamese could strengthen their air defenses in the "funnel" area to counteract the new bombing program. For example, a SAM site was established within target range of Mu Gia Pass within 2 weeks after the first bombing raid by B-52's in April 1966.

H. The Disruptive Effects of the Interdiction Campaigns

Based upon a limited number of interrogation reports, the individual North Vietnamese soldier is keenly aware of the danger of US air attacks from the moment he begins his trek to South Vietnam. Tensions caused by the threat of bombing, the inconvenience and delay of traveling bomb-ravaged transportation routes, and the need to maintain strict march discipline all add to the overall hardships imposed on the infiltrating troops. At the same time, there are few reports of US air strikes causing casualties. The major hardships faced by the infiltrating troops are the long two to three month march over rugged terrain, aggravated by poor food, inadequate medical attention, and homesickness.

The following incidents, gleaned from captured documents and interrogation reports, typify the disruptive effects the interdiction program has had on the infiltration of men and supplies into South Vietnam.

1. During 1965 and 1966 the bombing in Laos has damaged or destroyed several thousand trucks. A description of these attacks on the trucks and some of the problems for truck traffic created by the bombing has been obtained from a Pathet Lao defector, one [redacted] who reportedly traveled over the areas of Routes 9, 92, and 96 between June - August 1966. He said that he saw 300 - 600 trucks that had been destroyed or damaged, and saw one truck park that had about 75 destroyed trucks in it. (Continuous examination

of photography of Routes 92 and 96, indicated that numerous trucks were destroyed along these routes, but possibly not over 100). The defector said that on a 56-day round trip from Sepon to Southern Laos his 3-truck southbound convoy had been attacked 3 times and finally two of the trucks were destroyed. He was under attack by air 7 times in about 4 months, the last 4 times while in a north-bound convoy in which 9 trucks were destroyed and his truck damaged. He also said he never saw a plane shot down.

2. To avoid being bombed by enemy airplanes, the train stopped and the battalion took a rest in a State-owned farm which was 500 meters northwest of Dong Giao Station. [REDACTED]

[REDACTED] they continued their trip taking Route 1. They walked in Thanh Hoa Province and thenceforth moved at night and rested in day-time to avoid enemy airplanes.

3. In June 1965, they took a special train from the Dong Van Railway Station to the bridge head of Ninh Binh Province. At this spot, they were obliged to cross the river with ferry boats because of the demolition of this bridge due to US-Vietnamese air strikes. From Do Lon Bridge to the (Southern) terminal station of North Vietnam they were obliged to move at night time because of the US-Vietnamese air strikes. It was known that almost all bridges from Do Lon through Nghe An, Ha Tinh, Quang Binh Provinces were bombed. The two arch bridges were entirely destroyed, but the others were moderately damaged by the air strikes. They became unusable for

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vehicles but men could cross. In the case of a fallen bridge, the group was moved across by the VC local agency in junks.

4. During their infiltration, the troops encountered many hardships beyond imagination. The portion of the route from Thanh Hoa, especially the ferry boat crossings were always threatened by sudden air strikes of the US-ARVN Air Forces.

5. The local residents appeared to be anxious about aircraft bombings when the infiltration group asked them to provide temporary lodging. They were particularly concerned about the reconnaissance capability of US aircraft.

6. During the first 10 days all the infiltrating soldiers appeared to be very eager, but later due to the long route which they had to walk for almost 2 months, they were tired and discouraged. Since the time they had to climb mountain 1001, they became more confused.

7. Quynh Di Village was hit several times. The target was a bridge where Route 1 crosses a river. Thirty persons were killed during one raid. A bridge near Quynh Vinh was destroyed in March 1965. A bridge near Quynh Ngia was hit twice and completely destroyed. Quynh Son was hit repeatedly. Targets were a railroad bridge and warehouses which were destroyed. River traffic in the Anh Son District had been hit continuously and greatly hampered. Bombings are seriously disrupting road and river traffic. All bridges on Route 12 had been destroyed by October 1965. They had

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been replaced by underwater causeways for foot and vehicular traffic. Truck traffic in October 1965 was very light (many nights no trucks passed the troops at all) and always at night. All prisoners have seen leaflet drops but most were afraid to read them since it is forbidden. Most prisoners said that people realize aircraft seek only military targets but are afraid of being bombed by mistake.

8. When I came South, the Do Lon Bridge, the Hoang Mai Bridge, the Con Ho Bridge and Station I, which is called the initial station on the SVN infiltration route, were all completely destroyed. The majority of the bombings in North Vietnam have been on bridges, military barracks and a few factories, and most of the bombing has been from Thanh Hoa down to the 17th parallel.

9. In mid-October, just after having left Tuyen Hoa and arriving at a bridge on Route 12, 1st Company was hit by an air raid and suffered one KIA and 5-6 WIA, including the subject. "During stops, the only security posted were 3 men to listen for the approach of aircraft. Even this was not much of a threat on the trail in Laos due to the dense jungle canopy. Shelters and fighting holes were never prepared during these stops.

10. On the way (infiltration into Pleiku Province) there were airplanes above but there were no attacks or bombings. All members were disguised with leaves. When airplanes appeared they moved to the left or to the right of the trail, or remained still under tree cover, depending on the orders of the Company Command Staff. They

were not protected by any AA company. The platoons in the front and rear had to assign two squads to guard duty to report to the Company Command Staff if anything was going on around them.

11. They allegedly infiltrated into Pleiku Province from Cambodia to prepare for a large operation; however, when they arrived in the RVN they were bombarded by many aircraft. The air strike resulted in a large number of soldiers killed and wounded and forced the unit to disperse and retreat over a wide area. As a consequence, the five soldiers did not know the location or status of their scattered unit.

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